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# A production of discharge prints created with tie-dye/stencilling and their photographic comparisons

Paxton Sholademi Aremu

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Thesis Proposal for the Master of Fine Arts Degree

College of Fine and Applied Arts

Rochester Institute of Technology

Title: A Production of Discharge Prints created with  
Tie - Dye/Stencilling and their Photographic Comparisons

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Date: 2/22/78

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3/3/78*



TITLE: A Production of Discharge Prints created with Tie-die/  
Stencilling and their photographic comparisions.

The purpose of this thesis will be to experiment in another way of producing traditional designs on fabrics used by the local people in Nigeria, most especially the Yoruba tribes of the South-Western part of Nigeria. I will use both Tie-dye technique of resist and Stencilling method to produce designs and bringing the products nearer to the originals, made with cornstarch, "ADIRE-ELEKO". I will experiment on the usage of simple chemicals (extender and bleach) to discharge the patterns on fabrics. With these experiments, I hope to achieve a quicker way of patterning clothes in the traditional way. If successful this would make the products cheaper and easier to get and produce.

I would accompany my project with photographic images as the various techniques are explored.

COLLEGE OF FINE AND APPLIED ARTS  
ROCHESTER INSTITUTE OF TECHNOLOGY

A PRODUCTION OF DISCHARGE PRINTS \*CREATED  
WITH TIE-DYE/STENCILLING AND THEIR  
PHOTOGRAPHIC COMPARISONS

A THESIS SUBMITTED TO  
THE FACULTY OF THE COLLEGE OF FINE AND  
APPLIED ARTS IN CANDIDACY FOR THE DEGREE  
OF MASTER OF FINE ARTS

DEPARTMENT OF WEAVING AND TEXTILE DESIGN

BY  
PAXTON SHOLADEMI OLABISI AREMU  
ROCHESTER, NEW YORK  
FEBRUARY, 1978

TO MY WIFE JULIANA

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The bibliography at the end of this thesis suggests the people to whom I am indebted for ideas and information. I should acknowledge my heavy indebtedness to the brilliant advice from my thesis advisors, Professors Donald Bujnowski, Max Lenderman and Phil Bornarth. My warm thanks to my colleague, Miss Shelley Matthews, who kindly loaned me a few books for extra guidance. My regards go to Harvey Edwards and Gladys Abraham of The Learning Development Centre who helped in the corrections of the manuscript.

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## INTRODUCTION

When man first started living with his fellow man to protect himself, to hunt for food, and to raise his young, he expressed his feelings in magic ceremonies, in drawings and sculpture, and most especially in crafts of everyday life: his pots, his ornaments and the clothes he wore. The subject of fabric decoration is one of the most interesting available to man's study. As the first sentence above indicates, it is one of the oldest professions in recorded history. Evidence has been found that textile fabrics were in existence in the New World at least as early as 632 B.C., and many of the materials used in the past are still being used in our modern highly industrialized society. Many ancient beautiful and well decorated fabrics have not been surpassed to this day. We still appreciate this interesting past, but on the other hand we have not been spending all our time looking back at these products of old.

Today we have various techniques of putting designs on fabrics in form of decoration. Through this project, I will be combining the old (tie-dye) techniques with the new (screen printing) using the discharge method to achieve beauty. Let me touch briefly the individual importance. Screen printing, for example, can be real fun, but any person in pursuit of a creative process requires concentration and purpose in the technique of screen printing. It is a type of craft that needs



full creative and intellectual attention. The success of our endeavor lies in being flexible and trying different ways, methods and ideas.

The designs created with tie and dye are intricate and usually pleasing. The creation is sometimes very simple but the achievements are very delicate, interesting and mostly satisfactory. Every textile designer can learn more by coming in contact always with some of the old ways of fabric decorations. To me, everything that may serve to reveal the importance of textiles must be done with zeal and welcomed with joy. Anyone who has all-around knowledge and is able to note the relationship between all the branches of art, and who could connect the relation of style and development in all, would certainly be able to advance our knowledge greatly.

Discharge or extract printing method which I have chosen to work with, can be very dangerous and damaging to the printed fabrics if the right proportions of the chemicals are not used. This method of printing removes dye from the desired areas of the dyed fabrics leaving the areas partially white or pure white retaining the original colour of the fabrics. In some cases, discharge printing is done to obtain lighter areas so that a colour lighter than the ground colour may be printed in the discharged areas.

There is one important point every textile designer must know no matter how perfect; that both negatives and positives are equally important in his or her designs. It is very easy for anybody to focus attention on the positives alone leaving

behind the negatives, unprinted areas. These unprinted areas are of equal importance in judgment and appreciation. They are part of the visual statements and should be given equal attention.

In the Yorubaland, the traditional designers concentrate largely on the imported white shirting for their work. Sometimes velvet cloths are used. Traditionally, cloths are dyed in large earthenware pots. Each woman owns her own pots and works independently. Some are recognized as highly professional dyers and designers. At present, because of the western civilization, traditional native dyes are being used in combination with caustic soda. These people still work with the old techniques, wasting a lot of time in dyeing and in the making of Adire-Eleko type of fabric decorations. This is the application of cornstarch onto the surface of a fabric to create patterns. In the process of creating designs on fabrics using stencilling, each girl or woman works with lengths of cloth tightly stretched on a flat surface, applying what is known in Yoruba language as Eko; that is cornstarch onto the surface to form patterns. This form of design is very difficult, very expensive and the most time consuming aspect of their textile work. In making Adire-Eleko, each individual works on a section of the fabric to be decorated, small areas at a time, until the whole surface is covered. It takes a girl about a whole day or sometimes more to finish about two yards of material. She must likewise complete two identical patterns because the cloths are always sold in pairs. All these can be accomplished

faster by the use of photography and discharge technique.

As the proposal of this thesis reads, my intention is to find a faster way of producing Adire-Eleko effect on fabrics by the use of chemicals (glycerin, zinc, oxide, clorox) and screen printing, as opposed to the traditional methods, and arrive at the same goal. I am also aiming at reducing the boredom encountered by the local designers in terms of time wasted and equipment used and so reducing the cost and placing the products in the hands of the poor.

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## Chapter One

THE HISTORICAL BACKGROUND OF THE YORUBAS

The Yoruba tribes of West Africa are undoubtedly one of the largest ethnic groups south of the Sahara, and in most cases one of the most interesting and important peoples of Africa. "Their tradition of urban life gives them a unique place not only among African societies, but among non-literate peoples the world over."<sup>1</sup> To the east of Nigeria we have the Igbo, to the north the Hausas and to the west, the Yorubas. These tribes together constitute more than half of Africa's most populous nation, Nigeria. For more than a century the Yorubas were the dominant group among Nigeria's educated elite, and they provided school teachers, clerks and other white-collar jobs in Nigeria. Yoruba traders are found in nearly all the major market towns of West Africa. They are marvelous traders, and they travel length and breadth of West Africa, searching for wealth through trade contact with other nations. Apart from West African countries, these tribes, because of slave trade, have their descendants in other parts of the world today.

Descendants of Yoruba slaves, some of whom can still speak the Yoruba language, are found in Sierra Leone where they are known as Aku, in Cuba where they are known as Lucumi,<sup>2</sup> and in Brazil where they are known as Nago.

<sup>1</sup>William Bascom, The Yoruba Tribes of the Southwestern Nigeria, (Berkeley: Holt, Rinehart and Winston, Inc., 1969) p.1.

<sup>2</sup>Ibid., p.2



During the time of slave trade, untold numbers of the Yoruba were carried to the New World, where their descendants still preserve Yoruba traditions, including some which many Yoruba in Nigeria have forgotten.

### Origin and Early History

Like the early history of most nations, it is mostly or purely legendary. Because these people were illiterates, and their language unwritten, all that could be obtained is in form of oral traditions carefully handed down from father to son.

As the story goes, the Yorubas are said to have sprung from Lamurudu, one of the kings of Mecca, whose offspring were Oduduwa, the ancestor of the Yorubas, the kings of Gogobiri and of the Kukawas, the two tribes in the northern part of Nigeria occupied by the Hausas. Because of religious interractions in Mecca among the ruling houses, Oduduwa migrated with his children, and after a great and eventful trek, they finally settled down at Ile-Ife. It was in this place he met with Agbo-niregun, the founder of the Ifa worship. A few writers doubted this migration simply because there was no written history to confirm it. It was also discovered that there was no written record by the Arabian writers of any kings of Mecca; an event of this importance could not have been left unwritten by their historians. But on the other hand, the fact that these people came originally from the East cannot be of the slightest doubt, as their habits, manners and customs all go to prove. The Yorubas, though of various tribes, traced their origin from Oduduwa and the old city of Ife was fabled as the spot where

God created man, white and black, and from where they scattered all over the earth. An important fact which must be borne in mind is that the country was not altogether unpeopled when Oduduwa and his party entered it from the East; the probability is that the aboriginal inhabitants were conquered and absorbed.

### Religion

From the beginning, the Yorubas were entirely pagans. Other religions were introduced by the foreigners. Christianity, for example, was introduced by the Church Missionary Society in 1843, first into Abeokuta through Badagry and from there to Ibadan in May 1851. These people, however, believed in the existence of an Almighty God, whom they called Olorun, that is, Lord of Heaven. They acknowledge him, maker of heaven and earth, because he has to concern himself directly with men and their affairs. He has the helpers, the gods, which the Yorubas term Orisa. These tribes have many gods of which there are Oya, Sango, Orisa-nla, Ifa, Ogun, Esu and Sopona. Some of these images are shown on their fabrics but do not have any religious significance.

### Form of Government

The whole strength of the so-called Yoruba Country has never been thoroughly organized into one complete government in a modern sense. "The system that prevails is known as the Feudal; the remoter portions have always lived more or less in a state of semi-independence, while loosely acknowledging an over-lord."<sup>3</sup>

<sup>3</sup>Rev. Samuel Johnson, The History of the Yorubas, (London: Routledge & Kegan Paul LTD., 1969) p.40.

Yoruba proper, on the other hand, was completely organized. The type of government practised by the Yoruba proper was absolutely Monarchy: the king is more respected and dreaded than even the gods. The office is hereditary in the same family, but not necessarily from father to son. The selection of a new king is carried out by a body of noblemen known as Oyo Mesi, the seven principal councillors of the state. The Yorubas have an important and supreme head of all kings and princes of the nation. He is known as the Alafin, the direct descendant and successor of the founder of the nation.

### Economics

The Yoruba economy is based solely on hoe farming, craft specialization and trade. Farming is men's work, although a few women work their farms like men. A farmer works alone or with his unmarried sons, but in some cases men who have farms near each other may agree to a labour exchange. Apart from farming, nearly all Yorubamen engage themselves in weaving, dyeing, ironworking, brasscasting, woodcarving and drumming. This craft specialization makes each individual economically dependent upon the society as a whole. The carver depends upon the blacksmith for tools, and upon the farmer, the hunter and the trader for food, and upon the weaver for clothing.

### Esthetics (Weaving and Clothing)

Both men and women do weaving, using different types of looms. Women, for example, weave on a vertical mat loom which resembles that of Navajo Indians, producing a cloth about two feet long. Men weave on the horizontal narrow-band treadle



loom which produces a strip of cloth only three to four inches wide but as long as may be needed. Several hundred different patterns are woven on the men's loom alone, in Oyo and Iseyin, two of the important weaving centers.

To beautify their cloths, they use the popular dye, indigo, which produces varying shades ranging from a light sky blue to a purple blue-black, depending upon the number of batches of dye used. Women do resist dyeing using imported cotton sheeting and indigo dye to produce patterns of quite different types from those woven on the loom. During tie-dyeing, small seeds or pebbles are tied tightly into the cloth with raphia. Sometimes the cloth is tightly twisted and dyed, but in stencilling technique, cassava starch is painted on the cloth to form a sort of resist when the material is dyed.

Yoruba arts have changed, like all other aspects of their culture. Weavers, dyers, blacksmiths, leatherworkers and other branches of craft continue to produce, despite the keen competition of factory goods imported from Europe, India, Japan, as well as from other parts of the world.

Change is nothing new to the Yorubas. It has been going on for centuries beginning even before the arrival of the Europeans. Although I cannot at present chart these changes, or those that had occurred earlier, changes as we generally know and believe, had to accompany the development; so it did for the Yoruba tribes.

When the independence came after a brief political struggle, there was hope for a bright future for Nigeria, Africa's largest nation.



## Chapter Two

### FORMATION OF DESIGNS

#### Tie-dye

Some of the basic materials needed:

Rubber gloves

Scissors

Spoons

Cotton cords

Cotton muslin

Salt

During my study period in this school, I discovered that every artist has, first, to be a sound craftsman; but on the other hand, a craftsman may or may not be an artist. Confusing as these statements read, they are bitter facts. Some people are born with a sense of design, a sense that can link the hand and the eye, but others learn this sense. In whatever group you find yourself, to do the craft very well is the most important thing. Most people who like crafts enjoy working with their hands doing the work very well.

The simplest, cheapest and least artistically demanding of all the crafts is tie-dye. In this process of design formation you definitely need common sense, and if you can tie knots in a piece of fabric, read the dyeing instructions and follow them as accurately as possible, then you are already on the way to produce patterns that may be worth using. When you know your fabric and the appropriate dyes to use, then the first step is captured. When I started, my mind began to wander about and

the question of what form the patterns would take gave me great concern. I did not let this trouble me for a long time because I remembered that even if the result of my endeavour is disappointing, the products can still be used for various things. "Tie-dye is the most versatile and adaptable method with the added bonus that nothing, not even a real mistake, need be wasted."<sup>4</sup>

When doing the dyeing, you should have collected all the necessary ingredients together before you set out on your work. This is because once you begin, you do not want to be held up for lack of anything. I made sure I had nearly everything I needed before I set out on my eventful journey.

#### Treatment of the Fabrics Before Patterning

When dyeing, it is very important to note that all fabrics, whether old or new, should be well washed before attempting to dye them. Special surfaces, such as crease-resist or water repellent finishings, will resist all dye penetration and are not suitable, so they must be scoured before use. Some fabrics are likely to contain extra filling to give body to the materials. For this reason, it is very important to wash these fabrics very thoroughly before using them. These pieces were all washed to get rid of all sizing.

#### Sequence

The dyestuff was ground in a crucible with a little amount of water. After grinding, it was stirred into the stainless

<sup>4</sup>Hillary Haywood, Enjoying Dyes: How to Pattern Your Own Fabrics, (New York: Drake Publishers, Inc., 1974) p.3.

vessel containing water, on the stove. This was left for about 20 minutes. Later, common salt was added to the dyebath. The entire mixture was stirred for an equal distribution in the bath. In dyeing, the dyebath can either be used hot or cold; the choice again depends on the designer. Cold bath is sometimes better to work with in this type of project as you would have a control over the dye.

### Formation of Patterns with Dye

After the preparation of the dyestuff, the tied portions of the fabrics were dipped in successions for about two minutes so as to allow the portions to absorb enough dye; as in Plate 4. When the entire process was completed, the fabrics were left to dry thoroughly without rinsing. When tying the fabrics, care must be taken as

....there is a physical limit to the ways in which you can tie fabric up, tie-dye effects have their own inner discipline; this, though, a great variety of effects can be obtained. These effects can also be obtained by variety of tying methods. Exploring these possibilities for oneself and making personal experiments is half the fun.<sup>5</sup>

Neatness, accuracy and a working craftsman's attention to details are all important in tie-dye.

<sup>5</sup>Hillary Haywood, *Enjoying Dyes: How to Pattern Your Own Fabrics*, (New York: Drake Publishers, Inc., 1974) p.34.



## Chapter Three

### STENCILLING

"Stencilling in its simplest form is the covering of a surface with a thin impervious material; paper, plastic, etc., in which openings have been cut, revealing parts of the surface underneath."<sup>6</sup> Through these openings, paint, ink or dye is passed, thus when the stencil is removed, the shapes of the cut areas are printed onto the surface underneath.

In stencilling, various designs can be cut and there are limitations imposed because of the fact that the stencil must hold together. All floating areas must be attached to the body of the stencil by what is called "bridge;" therefore, when it is printed, the "bridge" has to be accepted as part of the design. Stencil making is basically the same the world over. Among the Yorubas, the men cut out stencils from scraps of metal such as the tin got from old packing cases or in some cases, lead sheets are used. They cut away the design which is to be white after dyeing, and their designs are basically traditional, their colours soft and silent.

#### How Cornstarch-Eko, Patterns and Stencils are Made by the Yorubas

##### Sequence

- a. Cassava flour is boiled together with alum until it is the consistency of a thick pudding.
  - i. The alum prevents the starch from dissolving in the indigo.
  - ii. When wrapped in leaves, the boiled starch will remain fresh for weeks.
  - iii. The prepared starch is known as Eko.

<sup>6</sup>Roger Marsh, Silk Screen Printing for the Artist, (New York: Transatlantic Arts, Inc., 1968) p.5.

- b. Prepared starch, obtained in the market, is boiled with blue and white alum.

### Motifs for Stencils

Before stencil is cut out by the designers, specific designs must be chosen, and most of these are geometric and some are stylized representation of men, animals or objects.

### Production of Drawn Starch Resists

1. a. The cloth is divided into squares with lines of starch, and different patterns are drawn freehand in each square by women and girls.
- b. Starch is applied with a feather, palm leaf, rib, or stick of wood.
- c. Children help produce the simpler patterns; in this way they become trained in the craft.

### Production of Stencilled Starch Resists

2. a. Starch is applied over the stencils by men.
- b. Continuous patterns cannot be produced with the stencil, since the solid parts of the plate must remain intact.
3. a. The cloth is dipped and dried three to four times over a period of several days.
- b. Dyeing is usually done by elderly women.
4. After dyeing, the surface is flaked off with a comb-like tool.
5. The remaining starch is boiled out.
6. Often the cloth is again dyed to reduce the strong blue-white contrast.<sup>7</sup>

In fact, stencilling can be in many forms such as Paper Stencils, Hand Drawn Stencils, Film Stencils and Photographic Stencils. The choice of which method to use depends on how complicated or simple your designs are.

<sup>7</sup>Cheryl Plumer, African Textiles: An Outline of Handcrafted Subsaharan Fabrics, (Michigan State University: 1970) pp.89, 90.

Paper stencils, for example, are used mainly for printing large areas and simple designs. Only simple shapes should be cut because intricate designs will not hold together unless great care is taken. Further, the paper stencils are simple cut-out shapes which should be thin and non-absorbent. In this case, transparent or semi-transparent paper is a good choice for a stencil, if you intend to work with paper stencils.

In hand drawn stencils, the drawing is applied directly upon the mesh and this is termed Serigraphy.<sup>\*</sup> This term has a wider application. In this method, glue and greasy ink can be used. The application of glue to the mesh will produce a negative print because where the glue is painted onto the mesh will be left as white when printed. On the other hand, positive effect is achieved when greasy ink is applied; that is, where the grease is applied, will later become the open areas of the mesh after the washout.

In film stencils, the third in the category, an advantage of producing accurate and intricate shapes without the stencils falling to pieces, is achieved. Also, it is long-lasting and can produce long runs. There are many kinds of film stencils available; films such as Profilm, Bluefilm and Greenfilm. Profilm is used with oil-based inks and consists of a shellac film, bound to tissue paper, this being temporarily attached by a paraffin wax to a backing sheet. After the design is cut out of the film, that are the shapes to be printed, the film remaining upon the backing sheet is then ironed into the mesh, and the backing sheet carefully removed, leaving the film attached.



All these films are semi-transparent.

The last in the series, the photographic stencil, may involve deep technicalities, but it is more assuring. If you can go through all the delicate parts successfully, then you are bound to be happy at the end.

### The Production of the Positive Images Photographically

In screen process photographic printing, printing screens were made from photographic positives which consisted of the designs on transparent plastic sheets. The positives were made from negatives which were produced by photographing the original designs. To get the positives, the film had to be exposed in direct contact with the copies, the negatives. On the other hand, to produce the positives, the emulsion side of the "autopositives" film was placed down, and the negative image was placed on it in direct contact on the contact camera. The arrangement consisted of the copy which was the negative, the film and the light transparent cellophane paper for covering the copy and the "autopositive" film in place. At this juncture, there must be a perfect contact between the film and the negative. After all the arrangements had been completed, the films were exposed, and the development followed. The process of making the direct positive images consists of the following steps: 1. Preparation for exposing, 2. Exposing, 3. Developing, 4. Rinsing, 5. Fixing, 6. Washing. All that is necessary are the three trays for holding the solutions. Each tray must be large enough to hold the film. When processing the film the three trays containing the solutions were arranged in the

following order: first, the tray with the developer; then the tray containing the rinse or stop-bath; and lastly, the tray with the fixing solution (hypo). Preferably, you can have another tray for holding water for washing.

After the exposure, development of the images took place. In developing the films or producing visible positives, the normal photographic solutions were used in this order: first, the "autopositive" film was put into a tray containing the developer. At this stage, the solution should be agitated to prevent unevenness of development and streaks. Enough developer was poured into the tray to cover the film completely, and the film was kept under solution at all times until the image was clearly shown. When the image was very clear, it was quickly put into the stop-bath to stop the development and to prevent any streaks or stain on the film. A practical stop-bath can be made by adding 1 part of 28 percent acetic acid and 7 parts of water making a total of 8 parts. The film was left in the stop-bath for about 30 seconds at room temperature before placing it into hypo or fixing solution for about 4 minutes. The purpose of the fixing solution is to remove any sensitive substance that has not been acted upon by the light or developer. After the fixing, the film was washed to remove all traces of chemicals. This was done by placing the film in a tray of running water for about 10 minutes. Afterwards the film was hung to dry naturally.



## The Making of the Photographic Stencils

The preparation of emulsion is very simple and consists of four main parts. 1. Preparing sensitive coating; 2. coating of the screen fabric; 3. exposing, and 4. Washing-out exposed screen.

### Materials and Equipment Used

1. Potassium bichromate solution; 2. Photographic positives; 3. Measuring utensils; 4. Screens; 5. Photo emulsion (tetko); 6. An arrangement for exposing photographic screens; 7. A light source to which screens were exposed; 8. A scraper, a coater for applying emulsion to the screens; 9. Source of water; 10. An exposing table.

The basic principle underlining the photographic stencil process is very simple. Light-sensitive gelatine is either applied directly on the screen or on a temporary support. These are the two basic methods of creating a photographic stencil. One is called the direct method and the other the indirect or transfer. In the direct process, the screens are sensitized with light-sensitive emulsion, and left to dry in the dark, developed and washed out so that the stencils are created directly on the screens. In the indirect method, screens are prepared first on a temporary support, then the processed film containing the design to be used is transferred and adhered to the underside of the prepared and clean screen.

All the screens were sensitized with a mixture of gelatine and potassium bichromate. One part of potassium bichromate to seven parts gelatine formed the sensitizing solution used. The

mixture was applied to clean, well stretched screens with a squeegee-like structure, the coater. You must insure that the screens are perfectly clean before coating with the emulsion. Finger marks, grease marks which would definitely prevent the emulsion from adhering perfectly to the screen fabrics must be prevented. The coating was applied evenly without allowing any bubbles to form, since bubbles develop into pinholes when the screen is developed. If desired, a second coating may be applied to the screen fabrics. The important thing is to make sure that the screen is well covered with the solution. Generally, the coating should not be too thick if fine prints are required. The coating of the screens was carried out under the natural room light since a wet sensitizing solution would not be affected by light. After the coating of all the screens, they were allowed to dry in the dark naturally. During this stage, care must be taken not to touch the surface of the screens while drying. The screens were kept in horizontal position to avoid dripping. In order to quicken the drying process, you can make use of a fan which I used in most cases. When all the screens were well dried, they were exposed to a strong light of carbon arc lamp.

#### The Transference of the Positive Images Onto the Screens

During the transferring operation, the positive for each screen was laid on the exposure table and securely fixed to it by means of transparent adhesive tape. Afterwards, each individual screen was placed on each positive, with the hollow underside facing up. Because of the nature of the screens,

this operation was carried out in a semi-dark area. There should be perfect contact between the screen and the positive image as this would eliminate any shadow on the screen which can cause distortion in the design.

After a firm contact was secured for each positive, a carbon arc lamp was erected for the next process, the exposure of the sensitized screens.

Exposure may be carried out in either daylight or artificial light. The table below gives suggested\* times of exposure required for light of different intensities and from different sources.

Light Source	Distance from Light Source	Time of Exposure
Bright daylight	-	10 minutes
Strong sunlight	-	5 minutes
Dull daylight	-	up to 2 hours
Mercury vapour lamp	45cm(18in.)	15 minutes
150-watt lamp	45cm(18in.)	3 hours
300-watt lamp	60cm(24in.)	up to 2 hours <sup>8</sup>

As the above table indicates, the length of exposure is determined according to the actual distance of the table from the source of light and the type of light used. For this project, a carbon arc lamp was used.

<u>Light Source</u>	<u>Distance</u>	<u>Time of Exposure</u>
Carbon arc lamp	10 feet	3 minutes

During the exposure, you should not allow the temperature at the face of the glass holding the positive images to exceed

<sup>8</sup>W. Clarke, An Introduction to Textile Printing, (London: Butterworth & Co. Publishers LTD. 1964) p.25.



30 degrees centigrade as heat would destroy the screen. After each exposure, the screen was immediately taken to the source of cold running water in the sink. The two sides of the screen were wetted with cold water in order to harden the exposed areas of the screen, the non-image areas. Almost immediately, a second treatment of a mild spraying to remove the soluble gelatine from the unexposed part, the part covered by the opaque designs, was carried out. The exposed part of the screen formed what is known as Stencil. After the second treatment, the screens were allowed to lie horizontally while drying in order to avoid the blocking of the spaces created by the opaque positive images during the exposure and washing processes. The screens were now ready for any minor repairs. You are set for the next process which is the revelation of the designs by the screens; that is to say, the printing process. During printing, you may find out that the designs are not revealing their structures as you like; this may be due to a series of reasons supplied below.

#### Possible Sources of Trouble in Screen Making Photographic Stencils:

A. Pin-holes (porous places) in the gelatine or P.V.A./dichromate film.

- Cause:
1. Frothing of the sensitizing solution.
  2. The sensitizing solution applied unevenly.
  3. Very humid atmospheric condition during application of the sensitizing solution.
  4. The sensitizing solution incompletely mixed.
  5. Dust on the screen before coating.

B. Exposed gelatine film is partly or completely washed out.

- Cause:
1. Under-exposed.
  2. Very humid atmospheric condition during

- application of the sensitizing solution.
3. Sensitizing solution heated to too high a temperature, causing decomposition.

C. Gelatine or P.V.A./dichromate coating not completely removed from unexposed places.

- Cause:
1. Over-exposure.
  2. Temperature too high during exposure.
  3. Screen kept too long at a high temperature before exposure.
  4. The positive not completely opaque.

D. The designs have poor edges and the lines have closed up in places.

- Cause:
1. The screen has not been in perfect contact with the positive.
  2. The coating is too thick.

E. Complete absence of coating in certain places of the screen.

- Cause: Impurities or grease on the screen before coating.<sup>9</sup>

<sup>9</sup>W. Clarke, An Introduction to Textile Printing, (London: Butterworth & Co. Publishers LTD. 1974) p.27.

## Chapter Four

DYEING OF THE FABRICS FOR DISCHARGE PRINTING

A discharge printing is a process by which colour is removed when the printing operation takes place on a previously dyed fabric. In this process, the dyes used for the ground have to be carefully selected so that when the discharge paste is applied, the dyed fabric will be permanently discolored giving a white or light brown discharge patterned effect.

After the choice of the materials to be dyed is made, it is always advisable to wash them in a mild detergent to remove all fillers that could disturb equal penetration of the dyes on the materials. After this treatment, the fabrics were rinsed very thoroughly in clean water.

The strength of a particular colour is defined in terms of percentage, and the table below will provide a rough guide for achieving the desired colour value.

Colour Value	% of Dyestuff in Relation to the weight of the Fabric
Deep	3-5%
Medium	1-3%
Pale	$\frac{1}{2}$ -1%

Method

Dyestuff used: Cushing's Perfection Dyes.

Proper amount of dye powder was moistened in a little crucible and a little amount of cold water was added and stirred into a smooth paste. A quart of boiling water was added and stirred into sufficient warm water on the stove. You should

use enough warm water so as to cover the entire fabrics for perfect dyeing. The dyepot must be large enough to permit working the materials without crowding. The dampened materials were entered into the dyebath, lifting and stirring continuously and raising the temperature gradually to simmer for about 15 minutes. In order to achieve a dark shade, the materials were lifted from the dyebath and about half a cup of common salt was added and stirred properly. The materials were re-entered and allowed in for another 15 minutes, lifting and stirring. When using this type of dye for cottons, you should allow the materials to remain in the dyebath until they have cooled, being lifted and stirred most of the time. After dyeing, the materials were rinsed thoroughly and excess water was squeezed out gently. These were later hung to dry.

#### Tying for Discharge Process

In tying, different kinds of thread and cord will be very suitable. Choices should be made by the type of cloth used as well as the kind of resist that is wanted. On the other hand, you should not forget that durability is an important factor. The discharged portions of the fabrics should not break down easily under the pressure of ties. When a very fine fabric is used, thin cotton cord such as twine is very excellent.

The particular way that the cords are tied and the tightness of the bind determine the character of the resist. The cord must be wound very firmly if the colouration of the fabric is to be maintained at least partially. Regardless of the manner in which the cord is bound, it must be tied securely if



it is to hold in the bleachbath.

### Discharge Dyeing

With this method, the colour is removed from the cloth rather than added, with the bindings and ties serving as the protective elements of the fabric colour. Colour is taken away by dipping the fabric in a bleach solution containing one part household bleach and two parts water. When choosing dye for discharge dyeing, it is very necessary to test a piece of the dyed material in a bleach solution to be sure that the colour will bleach out.

Cotton muslin used was dyed with Cushing's Perfection Dyes of different percentages and combination of colours.

### Method

The tied portions were immersed in the bleach solution very carefully so as to retain the intended designs. After the desired effect was achieved, the bleached portions were again immersed in cold water and squeezed to get rid of the bleaching solution. After the discharge process, cutting off the cords followed. This requires unusual careful attention because the cloth can be damaged easily. The use of a pair of scissors is highly recommended. After the cutting, the whole fabrics were washed in a mild detergent, rinsed, and later hung to dry.

Different colour has different bleaching effect. Black, for example, bleached to brown and dark blue mixed with black turned into gray after the bleaching process. Thus, these results are somehow very impossible to predict in advance.



## Chapter Five

### THE PRINTING OPERATION

The printing of the stencils is the climax to all the preparation in which so much energy has been engaged. The stencils will at last be made to reveal their exact visual contents. Before printing started, all the materials and equipment to be used in the printing operation had to be inspected. This was to find out if there was any fault which could cause trouble or delay.

In the printing process, designs may be applied to cloth by hand or by machine in several ways. The common method is by silk-screen printing, and the common methods used are stencil, batik, tie-dyeing and painting. The use of screen printing technique to transfer patterns on fabrics is a relatively simple method of printing which can be carried out without the use of complicated and expensive equipment.

#### Stretching of the Fabric to be Printed

The fabric to be printed was pulled, stretched, and pinned until the entire side was fastened on a straight line marked with pencil on the printing table. The second side was then pinned by pulling the fabric straight from the opposite sides. At this point some adjustment of the ends caused from stretching was made. Your efficiency in pinning down the fabric straight and tight will help in securing straight prints and will surely reduce registration problems. After the fabric had been pinned to the printing table, registration of the design

was made by means of a guide rail which is fitted along the side of the screen printing table. Adjustable metal stops were attached to the rail, and these were screwed in place to fit the width of each repeat.

#### Formula for the Discharge Paste Used

200 parts household bleach (clorox)  
50 parts glycerine  
200 parts zinc oxide  
200 parts gum tragacanth  
350 parts water

#### Method of Preparation

To 350 parts of water, add 200 parts gum tragacanth thickener. While stirring, add 200 parts household bleach, add 200 parts zinc oxide, and later add 50 parts glycerine. Stir the mixture very well. The paste is now ready to be used. In the preparation of discharge paste, you should control the strength as this would destroy the fiber and the designs.

#### Discharge Printing

In the printing operation, a suitable amount of discharge paste was poured into the well (the hollow side) of the screen frame and transferred through onto the fabric underneath by pulling the squeegee firmly across to the other side of the screen at an angle of approximately 45 degrees. The squeegee should be allowed to bite the mesh as it is pulled across, forcing the discharge paste through the open areas with a scraping action. One or two movements of the squeegee across the screen must be chosen, as three or four may be too strong

for the material to be printed. Before you start your printing, it is very advisable to try your print on a piece of dyed material with the number of appropriate movements of the squeegee. This would help in the opening of the image areas for perfect prints. A properly "wet-out" screen enhances a good transfer of paste to the fabric being printed. In order to avoid what is known as marking-off, the printing should not be carried out in a continuous order, but printed in alternative positions until all of the surface of the fabric is covered with the desired images. After each print, the fabric was ironed when still damp to quicken the process. Clearly, the ground colour appeared forming the positive images. During printing, care must be taken to avoid the spread and dripping of soluble chemicals which can result in loss of sharpness of the designs. All the discharge printings were transferred onto the dyed fabrics in this way.

### Printing with Dye

The printing procedure was carried out in the same way as for discharge printing. The only difference was in the printing pastes. In this type of printing, you add to the surface of the printed fabrics, but in the discharge method, you take away.

### After Treatment

After printing, the materials were dried to remove the moisture applied from the print paste. The drying operation is very important in order to have good printed materials, and

this operation is very important both in discharge styles and resist printed styles. It is important to dry the printed goods quickly and thoroughly. After the drying operation, the use of high temperature steam to obtain dye fixation is also necessary. Before steaming, the dyestuff is held in a dried film of thickening agent; a small proportion may have penetrated into the fiber during drying but this is not enough. When the steaming operation is employed, the printed areas absorb moisture and form a very concentrated dyebath from which dyeing of the fiber takes place. The work of the thickening agent is just to prevent the dyestuff from spreading outside the printed design; that is, to prevent "bleeding."

#### Washing-off

After drying and steaming had been completed, the printed fabrics were rinsed in good clean cold water to remove the thickening chemicals and surplus unfixed dyestuff. A mild soaping treatment in an appropriate detergent is also recommended.



PROBLEM

Since the clorox in the discharge paste would remove the photo-emulsion from the screen, I first of all coat the non-image areas with shellack to form a sort of resistance against the destructive action of the discharge paste. In addition, the paste must not be too strong as this can create pin holes in the screen. The problem can be avoided if profilm or any type of cut stencil is used.

## Chapter Six

THE CRITICAL COMMENTS

Among the Yoruba traditional textile designers, their pattern motifs had originally, a symbolic meaning. As shown in Plates 1, 2, and 3, my initial intention was not to decorate the works, not to depict some animals of which I am particularly fond, not even to make some fetish-like designs, but to record a sort of pictorial statement of an idea. The meaning may have been forgotten. Traditionally, accuracy of representation is very important and every designer always tries to follow the laid-down principles of designs. To copy the tradition as accurately as possible is their utmost wish. The chameleons in Plate 2 show clearly their belief that the head is an important part of all living things and this should be enlarged in most of their art works. In order to study designs of these tribes as well as other tribes in black Africa, the idea of accurate proportion should be forgotten. They always stress what is important to them. The representational forms and order of this material cannot be over emphasized. It is one of the most successful discharge prints to achieve Adire-Eleko resist method of fabric decoration. The dull colour of the material with its contradictory light-brown image areas gave the material a linear effect if viewed from a distance. In Plate 3 the same effect is achieved but the colours are more harmonious, settled and pleasing, opposing the discharge print (Plate 2), which has bright image areas. When you put Plates 1, 2, and 3 together

side by side, you will discover the disturbing aspect of various combination in Plate 3. First, the linear discharged half-drop effect and the tie-dye circular forms on the upper part brought about these contradictions. But to the parent tradition, it is pleasing. To follow tradition is the most important aspect of the designs. On the other hand, the fact that various elements are out of perfection in some drawings in which I am trying to express myself in terms of represented objects does not mean that they are necessarily ugly. What is important in these types of designs is the function and plausibility. The objects represented may in fact be distorted, but the material is not on this account ugly, as in Plate 2, which has exactly Adire-Eleko effect, with its personal glory and honour of the tribes, its colour, and the real meaning of the symbols. Symbols are used freely, and often other secondary meanings may be substituted for the original ones. The happy interpretation of the designs is the appreciation of how the forms are depicted and the meanings which they hold. The linear textural effect is one of the basic objectives of any Yoruba traditional designs, and their initial value lies in their visual appearance. To create textures is as important as the initial urge to create designs.

Comparing the discharge print (Plate 2) and its photographic image (Plate 1), one would discover a minor difference in terms of the general appearance, but basically, one is subtractive and the other additive. A very close-up observation of the discharge prints shows the blurring effect of the

designs whereas the photocopy has definite shapes as well as linear precision.

In Plates 4 & 5, the motif is the same but the effect achieved is different simply because of the additional tie-dye applied to Plate 4. This effect gave the material a different look. The stripes seem to contradict the general flow of the pattern. But for this particular material, it does not really disturb the general effect which is more settled in comparison with the discharge print (Plate 5). This has a stronger expression because of the bright image areas against the dull blue-black background. This is what Adire-Eleko is about. The linear shapes go hand in hand with the comb, but what would you say about the dotted textural effect surrounding the linear shapes? Are they disturbing the overall outlook? Should they not be there at all? The feeling obtained in aesthetic contemplation in this sort of work is either pleasant or unpleasant. If it is unpleasant, it does not mean that the textures are either out of place or should not be there at all. If the textures are observed very closely, one would discover that their omission may render the material unfinished. As I said earlier, what is important for beauty is not truth but plausibility. Combinations of many shapes can work together to form pleasing designs as in this particular design. When you compare Plates 4 & 5, you will find out that if tie-dye is combined with Plate 4, as it is in Plate 5, the whole image areas will be distorted. In other words, the Adire-Eleko technique of patterning cloth has more limitations than its photo reproductions.



In Plates 6, 7 & 8, the richness of surface textures is perhaps a more noticeable pattern element in the materials. The desire to cover the entire surface of the materials with textures and bird dominated my mind. This combination of different images broken up into rectangular forms and a conscious relationship between the texture areas and the bird is clearly shown. In Plate 6, the combination of screen printing with discharge-tying created a marvellous effect of light and shade. It is an effective technique which has been elaborated by the use of black printing dye (screen printing). The fragile looking circular discharged areas gave life to the material. But the undischarged areas gave a perfect solidity when viewed as a whole unit, in contrast to Plate 7 which is more settled with its silent colour. The effect of cool and peacefulness achieved in this piece can be attributed to its colour combination which can be compared with Plate 3. On the other hand, Plate 8, which is a discharge production, has a different visual message, strong and beautiful. When closely observed as in other discharge prints, the same blurring effect is seen. This means that it is very difficult, if not impossible, to get minor details in discharge prints. The chemicals seem to work beyond the expected limit. The same problem is encountered in the traditional cornstarch resist method. The main comparison to be made between discharge method and its photo reproduction is this blurring effect which is also common in Adire-Eleko. Sometimes this effect adds beauty to the printed materials. Because of this reason, you must not be tempted to avoid this

effect if possible, for in works of art, beauty is achieved in various ways. This may be one of such ways. A work of art means to us whatever effect it evokes in us; a work which has no effect on us means nothing to us, and whatever effects it evokes constitutes its meaning for us. As you are now partially acquainted with the design of these tribes, the effect it evokes in you gradually changes, and in that case its meaning for you gradually changes too. Its meaning may or may not be describable in words - in most cases it is not. Probably no work of art has meaning in itself; it has no meaning until it is given meaning by someone, the artist himself. It is through its maker that the insight to the work can be reached; so it is for most of the designs of these tribes.

Closely akin to the other patterns, Plates 9 & 10 are some of the variations of decoration with bold pattern motif. The flowery images stand out clearly of the background boldly and dominating the entire surface of the materials. When identical images are arranged in a fixed pattern, as seen in both plates, we immediately group them into subpatterns. We see them as forming vertical, horizontal or diagonal lines. Again, when a series of similar dots, equally or unequally spaced, are seen for a longer period of time, the mind has a tendency to arrange them into groups forming different patterns; so it is in Plates 9 & 10. This effect is equally achieved in some of the other prints. Plates 9 & 10 are not entirely different from the other plates, but the only minor difference is the spartial effect on the materials. The other effects are the same as in

the other plates, the blurring effect of the discharge paste on the discharge prints, and the clear-cut of its photo reproduction as in Plate 10. The solid blue colour in contrast with the light brown ground colour, make the material an exact reproduction of Adire-Eleko. The test of good prints, to me, is the powerful effect, the spirit, the function, the refinement as well as the dignity they possess.

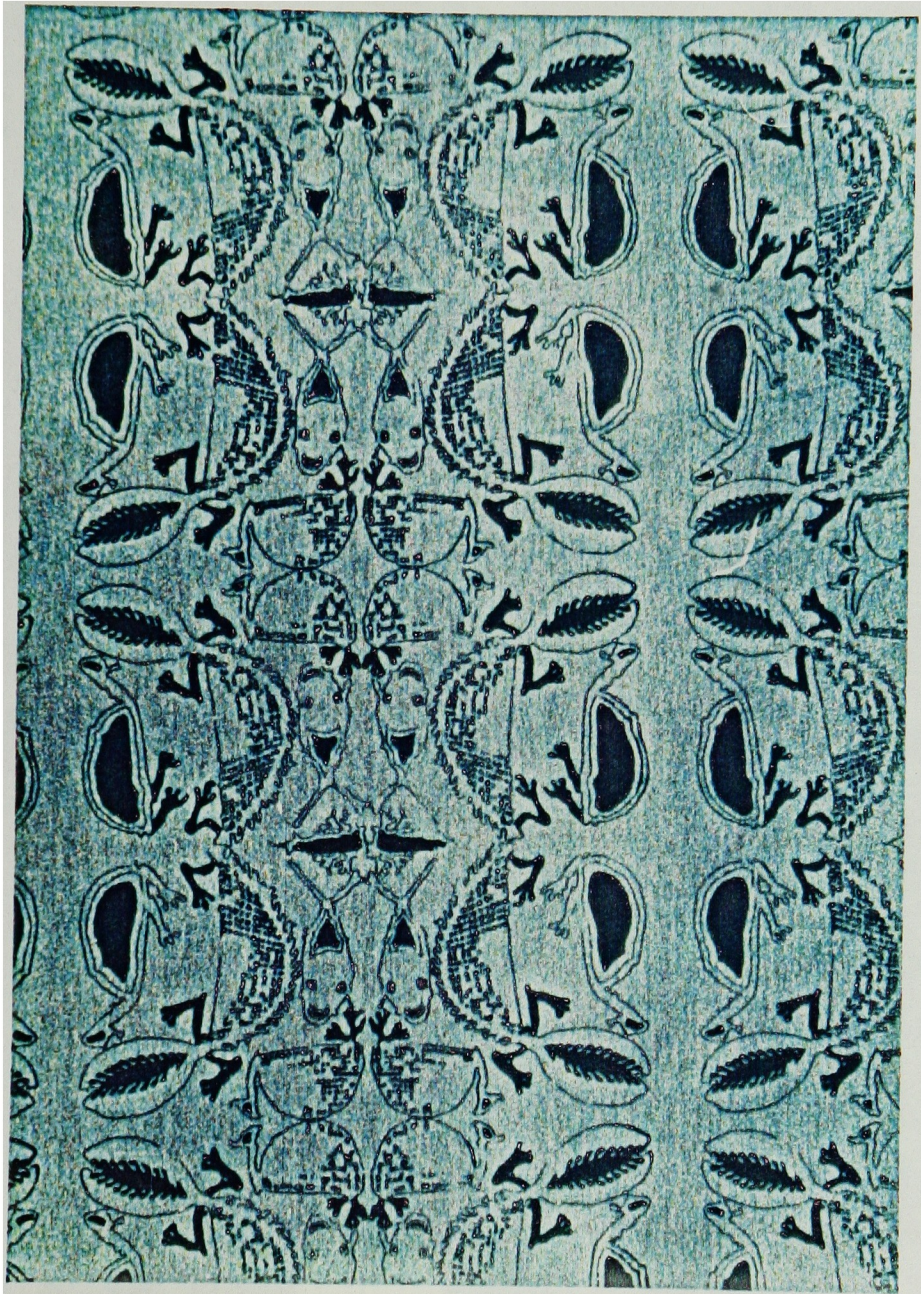
Plate 11 has an entirely different effect in that it has distinct positive and negative areas. The various combinations used really worked well. As in other fabrics shown, this has a different function because of the effect the fabric gave. This type of pattern is better used as wall decorations (hangings). The shades of brown against the dark blue background, the black solid prints over the light red in the centre of the tied areas, the difference in sizes of the tied areas all these combined to create a very beautiful effect.





Plate  
1







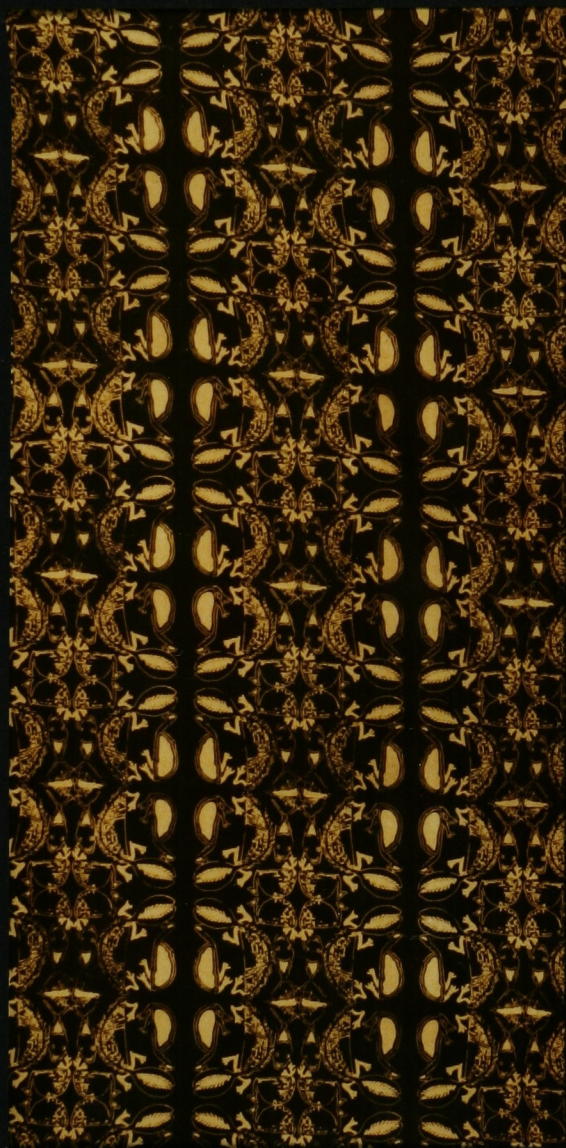


Plate  
2



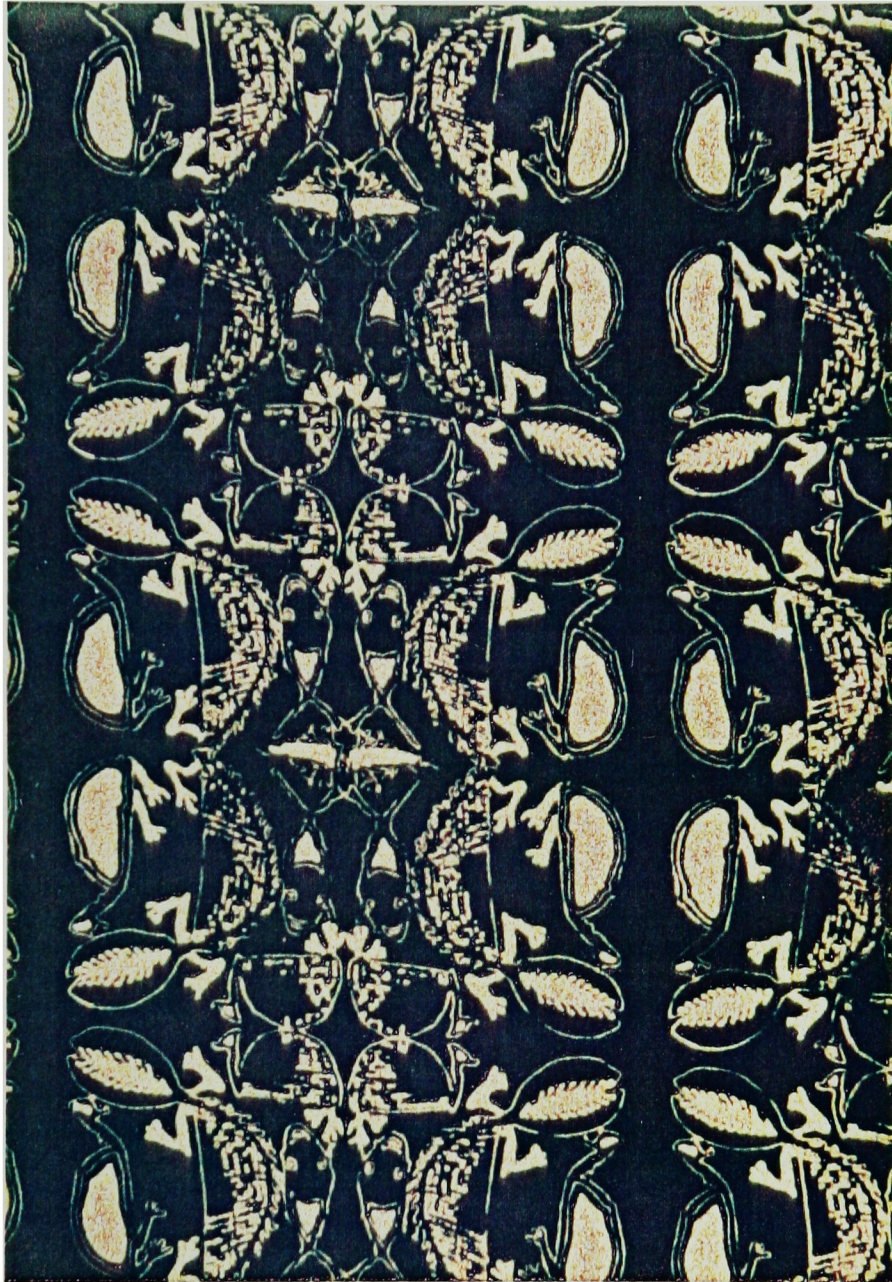
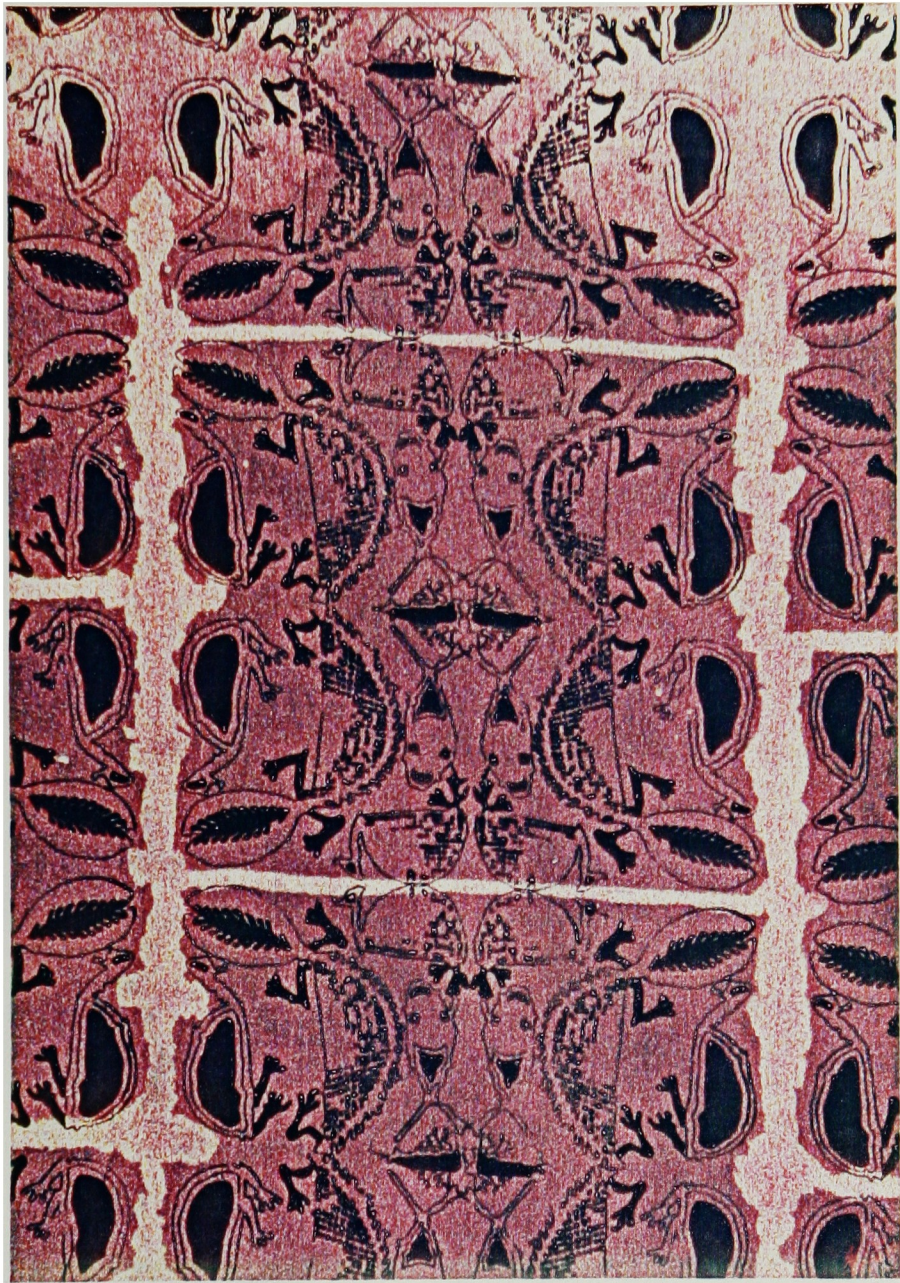






Plate  
3







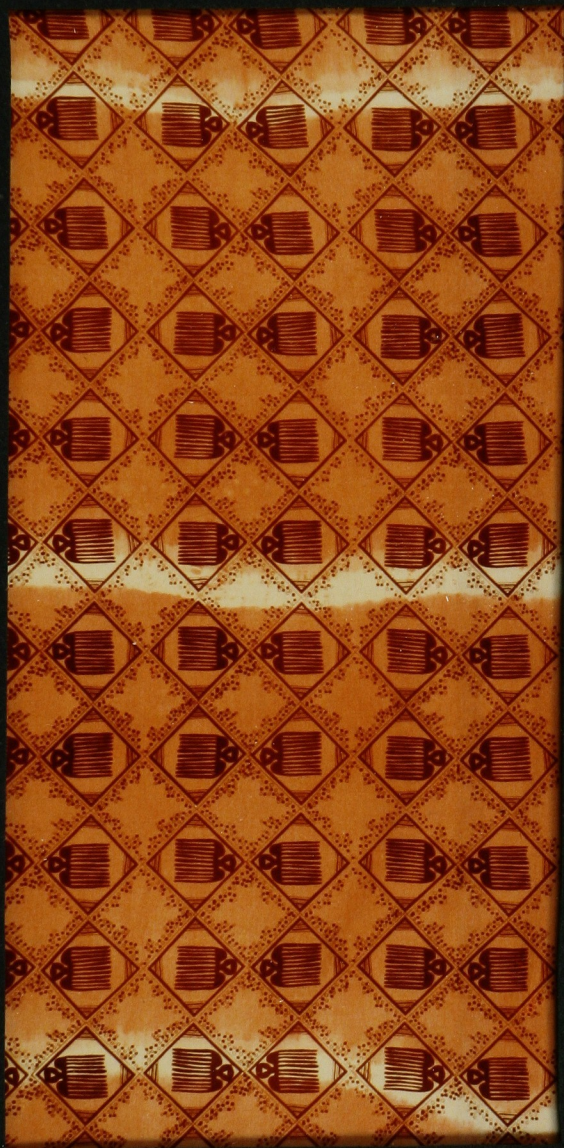


Plate  
4



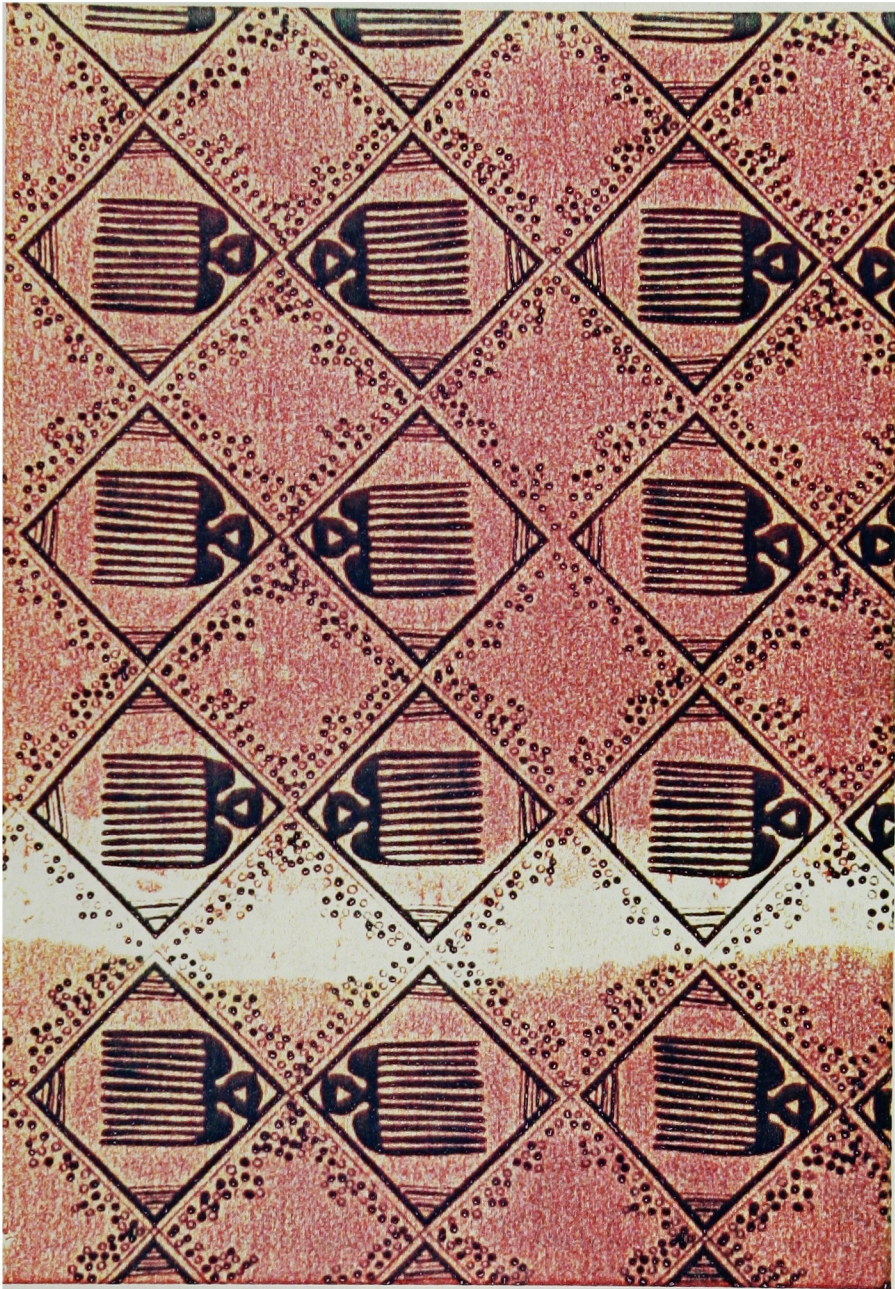
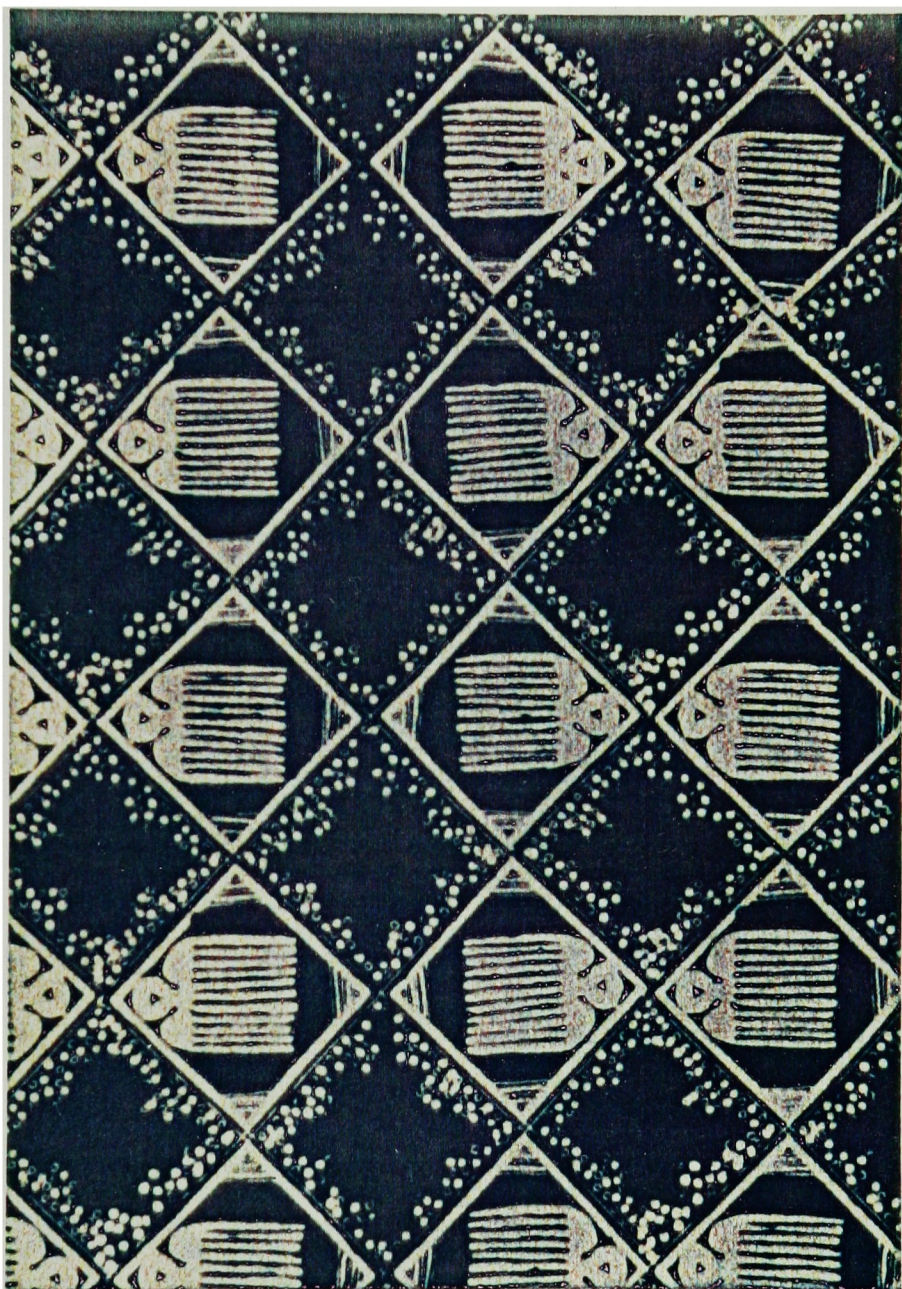






Plate  
5







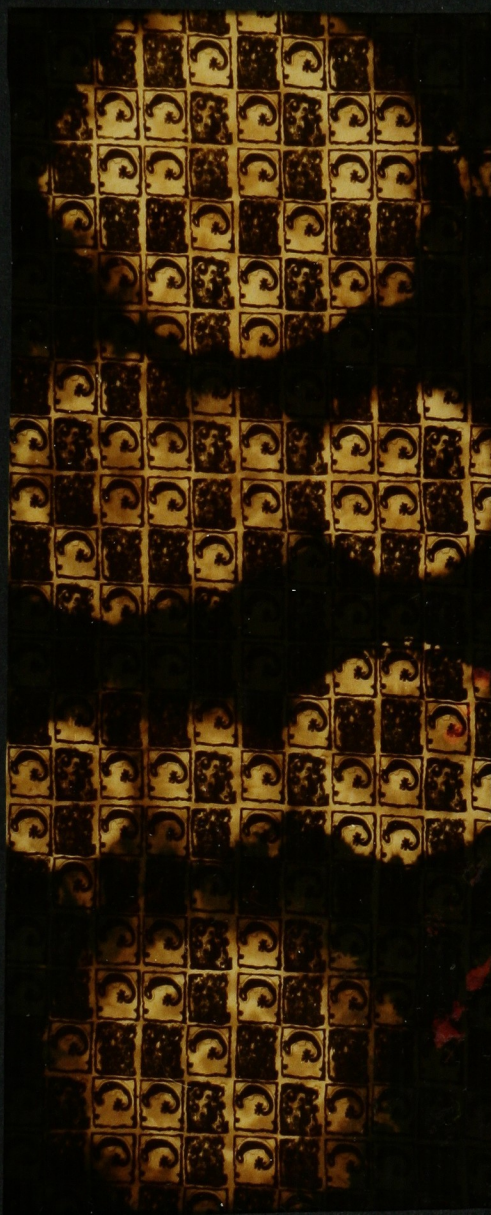
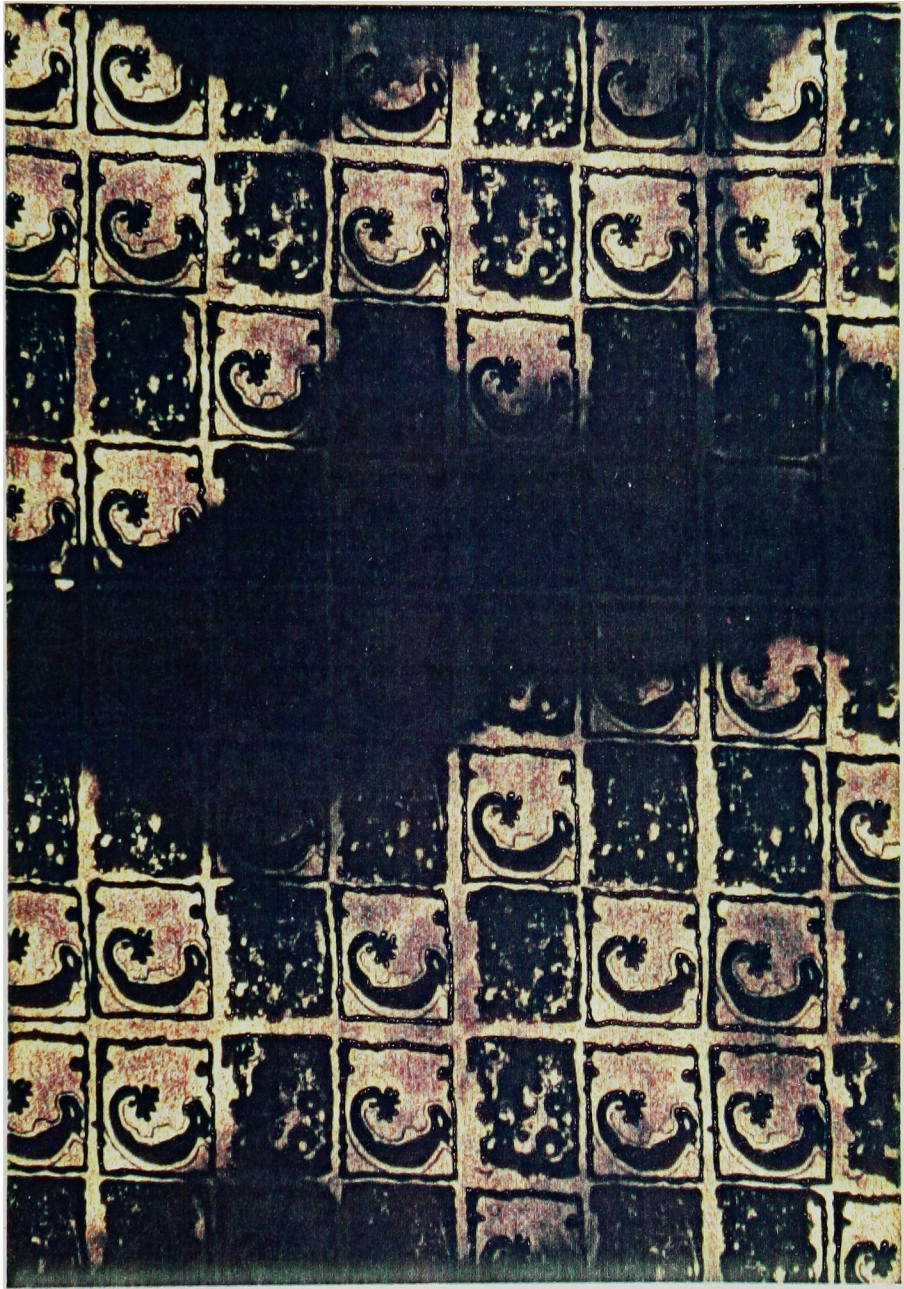


Plate  
6







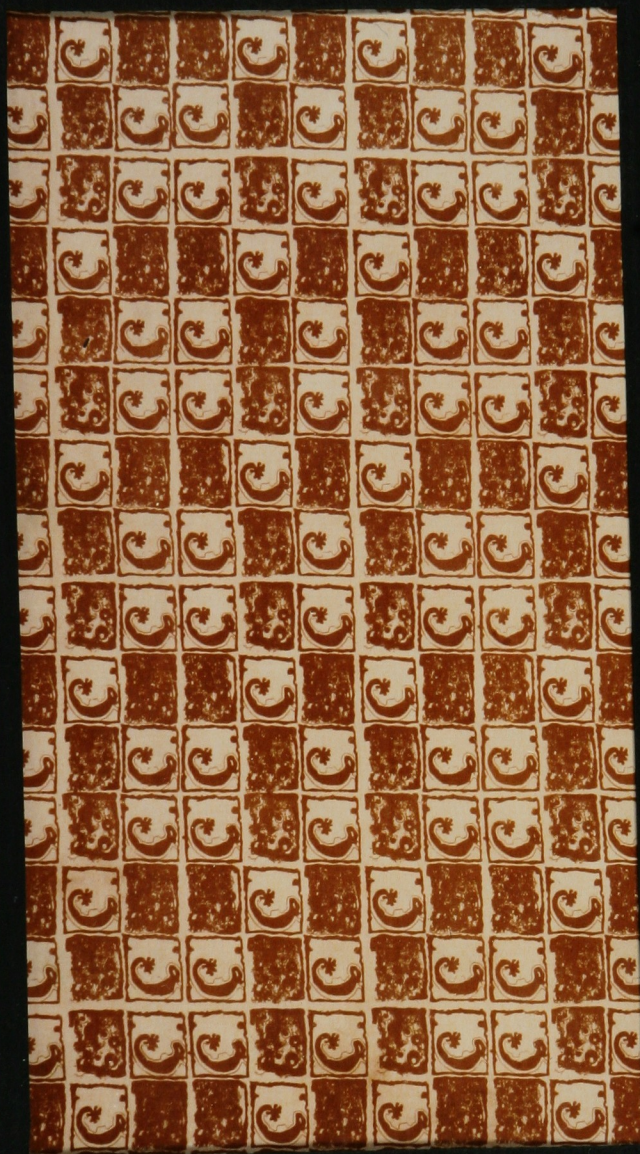


Plate  
7







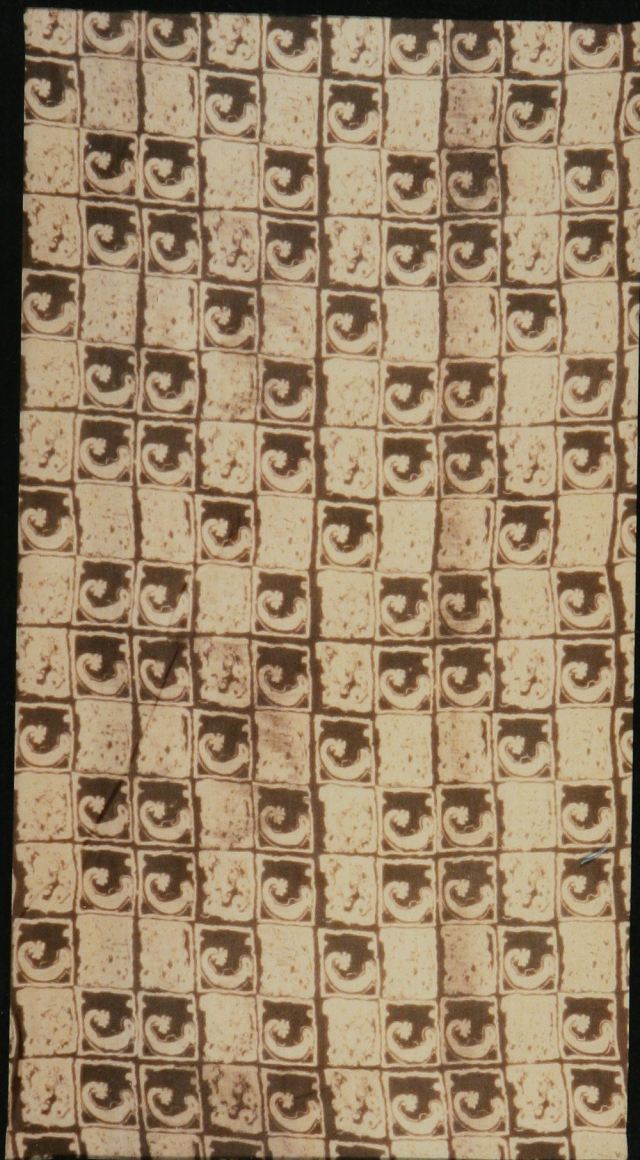


Plate  
8







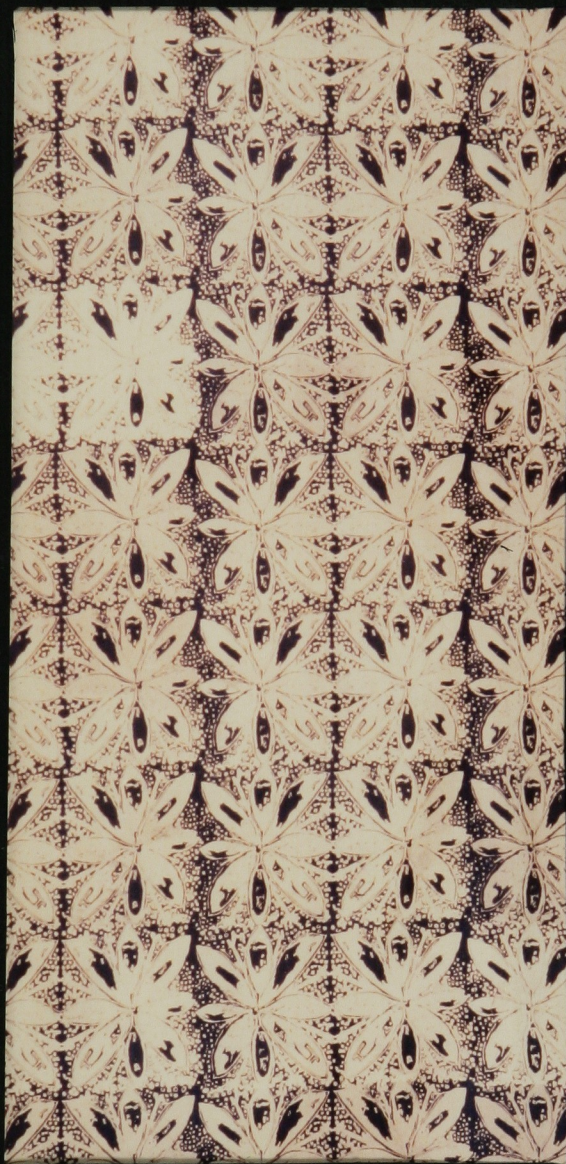


Plate  
9



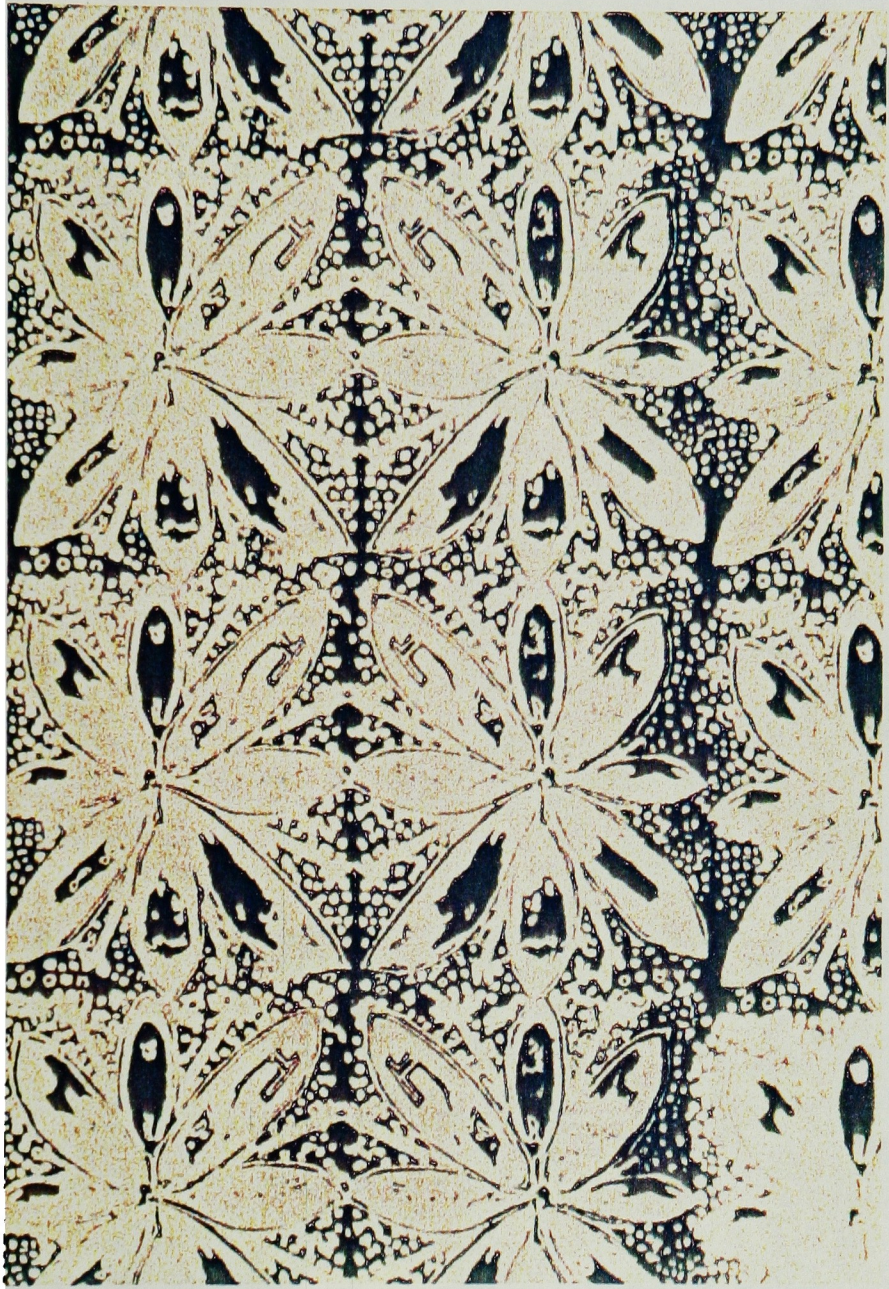






Plate  
10



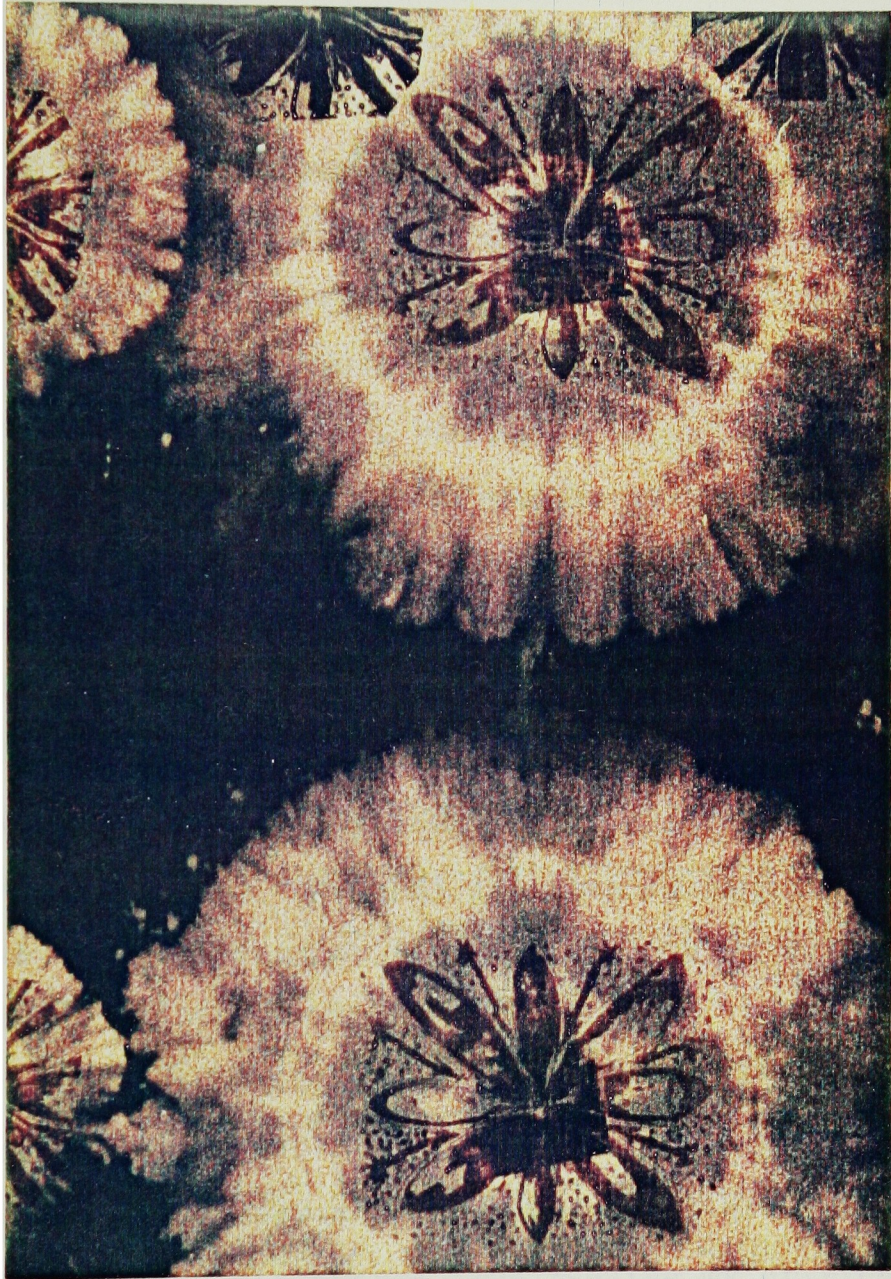






Plate  
11







## CONCLUSION

Nothing is more fascinating than watching the ground colour of the dyed fabrics appearing a few minutes after the application of the discharge paste. As you have read in this thesis, the technique of printing with discharge paste requires a very careful procedure especially during the printing operation, since any splash or drop of the paste would definitely disturb the image areas. I was very concerned about making this mistake, especially whenever the printing of an individual fabric was getting to an end. I can never forget the experience I went through, in the making of the sample prints. This really gave me enough courage to face minor errors that occurred as a result of the dripping and splashing of the paste.

It was very interesting to work with this medium, as you could never tell what particular effect you were going to achieve with each application of the paste until the end of the discharge process. The most important aspect of the whole process was this application when it was printed with dyestuff (additive) to create photographic images. I made sure to observe all the precautions of discharge printing (subtractive). The thickener was moderated in order to avoid bleeding. These precautions are important if good results are desired.

As you have discovered from reading my critical comments, discharge prints (subtractive) and the ones with dyestuff (additive) have little or no difference. The discharge prints show a blurring effect, which is common in the Adire-Eleko

technique, whereas the ones printed with dyestuff have definite shapes and a linear precision quality.

This technique worked very well and the speed of production was faster than the traditional methods, although the preparation of each photographic screen took about 3 hours. I did not allow this to bother me as I knew I was going to gain time in the printing operation. The printing operation, which was the main body of my thesis, went very fast. It took me approximately 5 minutes to print 2 yards of cloth, with the discharge paste to achieve Adire-Eleko effect, in contrast with many hours and sometimes days spent by the local designers, using the cornstarch resist method.

The Yoruba designs for personal adornment used on the printed fabrics have their own aesthetic value. Each is also a lively design, carrying its traditional motifs into modern use. Like many other Yoruba traditional designs, the designs shown in this thesis are very dynamic. I cannot in fact compare the designs of these people into the exact categories used by Western societies; nevertheless, the designs reflect the same fundamental urge of these people to create things of beauty. What is remarkable about these designs is the beautiful effect they create, using motifs taken from common objects and animals.

This project has surely set me on a way to future development. The more I worked with this technique, the more intense I became and the more excited about the possibilities. When I proposed this thesis, it was just like looking for something to develop from nowhere. I had many contradictory ideas in my



mind about how to develop this thesis. After many experiments and several failures, a surprise of what I was hoping for turned up and I developed this opportunity to the fullest of my abilities.

Working with something new always creates an excitement in my heart, which I enjoyed during the process of printing with the discharge paste. It was not all that easy for me at first to think of positive results, but I made sure I always worked towards a complete knowledge and understanding of the discharge techniques.

Each discharge print always gave me a sort of urge to go beyond the realms of my project because of many possibilities I was exposed to. During this period, I was aware of the fact that it was not enough for me to think about the experiments alone, but to see beyond, to aim for something new, to delve into the past, improve on it, and bring out whatever I can find in terms of techniques for fabric decoration.

The manner in which I started my project changed towards the end because the more I worked, the better the results became and more confident I was in the handling of the equipment used. To be confident in one's work is an achievement of its own and I am happy I have this.

The results of these experiments have definitely set a road for further development for me and my future works will be an outgrowth from these experiences and research which have just begun. I will continue to develop upon my return to my country where I will be able to explore these techniques of discharge printing further.

## SELECTED GLOSSARY OF SOME YORUBA WORDS

- ESU or ELEGBARA - Satan, the evil one, the author of all evil.
- ORISANLA - Co-worker with God who has creative powers.
- OGUN - god of war, and all instruments made of iron are consecrated to it hence Ogun is the blacksmiths' god.
- SOPONA - The small-pox which is generally believed to be one of the demons.
- IFA - A great consulting oracle in the Yoruba country, and was introduced at a late period by King Onigbogi.
- SANGO - god of lightening and thunder. Sango was the fourth king of the Yorubas and defied by his friends after his death. He ruled over all the Yorubas including Benin, the Popos and Dahomey.
- OYA - Sango's faithful wife who stood with him through thick and thin.
- LAMURUDU - One of the kings in Mecca from whom the Yorubas originated.
- ODUDUWA - The ancestral father of the Yorubas who migrated from Mecca.
- ADIRE - Tie-dye
- EKO - Cornstarch



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